FROM SPECIAL WEAPONS COMMAND TO AIR FORCE SPACE TECHNOLOGY CENTER

The origins and heritage of Air Force Research Lab's Phillips Research Site - first in a series

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"I believe the security of the United States of America will continue to rest in part in developments instituted by our educational and professional scientists."

– Gen. Henry "Hap" Arnold, Commanding general, U.S. Army Air Forces, 1944

Toward the end of World War II, General Arnold had serious concerns about the future of Air Force research and development. During World War I, he had seen Europe's technically superior aircraft outfly their American counterparts. Near the end of World War II, he recognized enemy technical advances, especially in jets and rocketry. American science and technology had performed very well, and Arnold wanted to ensure that the post-war Air Force maintained its edge.

To achieve his vision of a superior, long-range R&D program, General Arnold established the Army Air Force Scientific Advisory Group. This committee evaluated technological disciplines as well as facilities, education, and government-industry-academia partnerships. Its extensive recommendations in those areas and others foreshadowed the current Air Force laboratory and test and evaluation community.

One technology prominent to the new Kirtland Field at Albuquerque, New Mexico was America's emerging atomic energy development program. Nearby Los Alamos was the site of the Manhattan Engineering District's atomic laboratory. Although post-war downsizing jeopardized Kirtland's future, the move of Los Alamos's "Z" division to the base, which soon became Sandia Scientific Lab, sealed Kirtland's future as a premier R&D facility.

By the late 1940s, General Arnold and others realized the need to mate nuclear weapons, designed and built by the national labs, to Air Force aircraft. Other related responsibilities for the newly created Air Force were to provide for the weapons' surety and safety, and support nuclear testing conducted in the Pacific and Nevada. To meet these needs, the Air Force formed the Special Weapons Command on Dec. 1, 1949 at Kirtland AFB.

With the creation of the Air Research and Development Command, which took over all Air Force R&D functions, SWC lost its command status and became the Air Force Special Weapons Center on April 1, 1952. AFSWC continued to handle SWC's nuclear responsibilities, such as developing delivery systems and systems components, research and testing.

After a decade of operation, the Air Force decided to separate AFSWC's R&D tasks from its testing functions. Elements of AFSWC's Research Directorate and Development Directorate formed the core of the Air Force Weapons Laboratory (AFWL) established on May 1, 1963. (Due to restrictions in the 1963 Nuclear Test Ban Treaty, AFSWC was disestablished in 1976.)

AFWL's duties initially included determining and measuring nuclear effects on aircraft and missile systems, such as the electromagnetic pulse or EMP generated from a nuclear blast. Determining exactly how EMP interacted with and degraded electronic systems required building specialized facilities, including the massive all-wood TRESTLE EMP test structure. AFSWC and later AFWL engineers conducted High Explosive Simulation Tests to replace atmospheric nuclear tests prohibited by the Nuclear Test Ban Treaty.

AFWL also studied the survivability and vulnerability of spacecraft and satellite systems exposed to both natural and man-made radiation, as well as radiation's effects on men in space. These studies resulted in designing shielding and radiation-hardened electronic components that now protect military and commercial spacecraft and missile systems such as GPS and Minuteman.

With the invention of the laser in 1960, the Air Force quickly acknowledged the potential of this energy force as a weapon system. As part of Project DELTA, AFWL "blue-suiters" and government scientists demonstrated in 1973 that a ground-based carbon dioxide laser could destroy a radio-controlled aerial target. Next, the laser was combined with a sophisticated acquisition pointing and tracking system and installed on a C-135 aircraft known as the Airborne Laser Laboratory. Believers in the ALL were rewarded in 1983 when the ALL shot down air-to-air AIM-9 and ground-to-air BQM-34A missiles.

AFWL's primary focus was on lasers, optics and directed energy. In 1977, three "blue-suiters" and an Air Force civilian invented the Chemical Oxygen-Iodine Laser. The lab in the 1980s made tremendous strides at the Starfire Optical Range in advancing optics for both target acquisition and space imaging systems. Other research into potential directed energy applications included investigating the feasibility of using high-power microwaves as weapons.

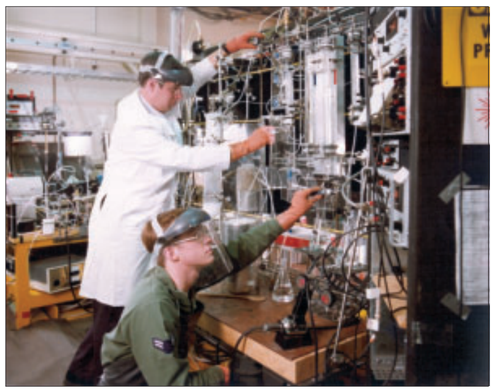
AFWL produced a myriad of other successes. The Modular Airborne Fire Firefighting System configured C-130s as slurry bombers, still used by AF Reserve units to combat wildfires across the United States. Also, AFWL developed the high-explosive Daisy Cutter bomb, used to clear landing zones in Vietnam and more recently to destroy caves in Afghanistan.

To better support the new Air Force Space Command, Air Force Systems Command stood up the Air Force Space Technology Center at Kirtland AFB on October 1, 1982. AFWL and two other Air Force labs dedicated to space-related research – Geophysics Lab at Hanscom AFB and Rocket Propulsion Lab at Edwards AFB – reported to AFSTC.

Under AFSTC's guidance, AFWL continued to make advances in space-related research. The Relay Mirror Experiment or RME confirmed that a ground-based laser beam could be bounced off a satellite and accurately returned to a target on the earth. And the Fiber Optics Space Experiment studied long-term effects of background radiation on spacecraft systems.

By the late 1980s, the Air Force needed to streamline its laboratory system. It consolidated thirteen labs and three centers into four "superlabs" conducting research in avionics, aerospace medicine, electronics and space. The "space lab" consolidated Weapons, Geophysics and Rocket Propulsion Labs, and AFSTC. But Air Force leadership did not want a generic "Air Force Space Laboratory" name. Instead, they wanted to name the lab after an individual whose experience and prestige reflected the new organization's focus on space research.

The Air Force Weapons Laboratory developed a multitude of sensors for space-based research. On the left, NASA's Gemini IV used an AFWL sensor, and above (l-r), Lt. Marion F. Schneider (Mr. Schneider still works for the Air Force Research laboratory Space Vehicles Directorate), Glenn C. Ainsworth, and Lt. Joseph F. Janni examine a passive dosimeter unit used on the Gemini VI spacecraft.



LEFT: One of the Air Force Weapons Lab's inventors of the Chemical Oxygen Iodine Laser, Capt. Nick Pchelkin, works with Airman Gary Lee on COIL I.

BELOW: The Airborne Laser Laboratory – a modified NKC-135 – in flight. It is now on display at the Air Force Museum at Wright-Patterson AFB, Ohio.

ABOVE: One of the Air Force Special Weapons Center's earliest experiments involved an aircraft penetrating atomic clouds in order to take radiation samples. In this photo taken after an Operation TEAPOT nuclear detonation in 1955, Capt. Charles Oldfield removes a film badge attached to a string from his stomach to determine internalized doses of radiation.

Next week: "No, we're not Philips Semi-conductor"